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CONJUGATED METHOD FOR STUDYING THE BASICS OF THE THEORY OF THE COURSE "DRAFT GEOMETRY"

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ABSTRACT

The article is devoted to the conjugate method of studying the foundations of the theory of the course "Descriptive geometry" for university students in the classroom. The proposed structure for studying descriptive geometry using an integrated approach makes it possible to reduce the amount of study time for solving graphic problems, creates the prerequisites for the development of a creative approach in using variability in accordance with the circumstances.

Keywords: *conjugate, graphic task, creative approach, variability, teaching methodology, fundamental, plane replacements, rotation, plane-parallel movement.*

АННОТАЦИЯ

Статья посвящена сопряженному методу изучения основ теории курса «Начертательная геометрия» для студентов вузов на занятиях. Предлагаемая структура изучения начертательной геометрии с использованием комплексного подхода позволяет сократить объем учебного времени на решение графических задач, создает предпосылки для развития творческого подхода в использовании вариативности в соответствии с обстоятельствами.

Ключевые слова: *сопряженное, графическое задание, творческий подход, вариативность, методика обучения, фундаментальная, плоские замены, вращение, плоскопараллельное движение.*

INTRODUCTION

At the present moment, with the development of science and technology in the system of higher education, there is a constant introduction of new disciplines at the expense of reducing others. The increase in the density of the flow of educational material and the still very low level of graphic training of applicants to universities make it necessary to provide a solid stock of knowledge in descriptive geometry necessary for further training and in the future professional activity of a specialist. The listed circumstances force us to look for more effective teaching methods, while there is a need to revise the structure and content of the theoretical material of the

Descriptive Geometry course and select a certain system of tasks in order to intensify the educational process.

The method of teaching descriptive geometry has been perfected over the years. Today, teachers of this discipline are developing their own teaching methods, looking for the most rational, economical ways of presenting theoretical knowledge, selecting tasks for practical classes, forms of control, using multimedia and so on. At the same time, the study of questions of the theory of educational material in descriptive geometry is based on the traditional presentation of educational and methodological literature.

DISCUSSION AND RESULTS

In this article, an attempt is made to summarize the teaching methods with an integrated approach to studying some of the fundamental questions of the theory of descriptive geometry for students of the Faculty of Civil Engineering of the Fergana Polytechnic Institute.

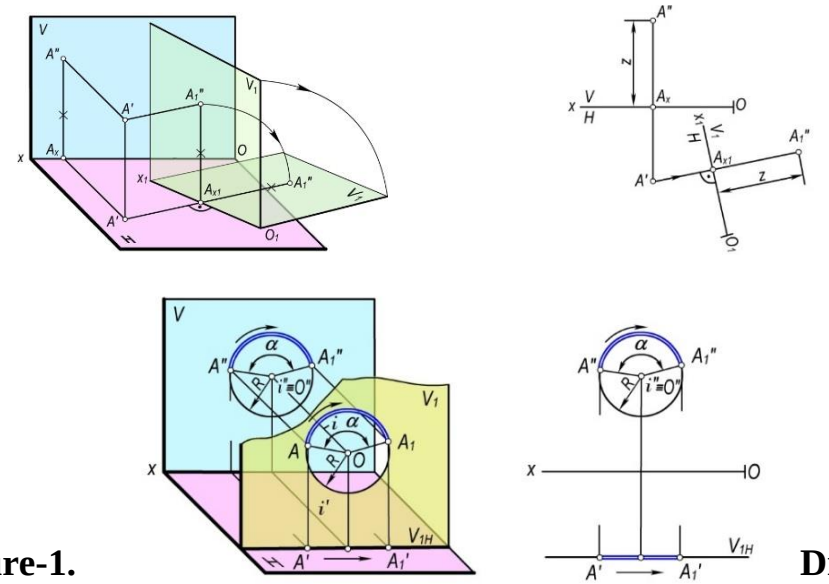


Figure-1. Drawing point: A-replacement of projection planes; B-rotation.

As you know, the fundamental basis of the theory of descriptive geometry at the initial stage is the study of a drawing of a point, line and plane. The proposed methodology consists in the fact that at this stage of training, the concept of "transformation" is introduced. Methods of transformation should run like a red thread through the entire course of descriptive geometry, i.e. be used whenever possible in every topic. In this case, the transformation methods are considered

sequentially, as necessary, from the simplest methods that can be started already when studying the drawing of the point.

Traditionally in the literature, a point is considered only in 3 projection planes, where the original of the space is fixed motionless, i.e. static. In the proposed technique, it becomes possible to consider the receipt by the projection of a point in the system of replacing the projection planes

This immediately forms the concept of the static and dynamic nature of the original space and projection planes, showing that objects in space can change their position, thereby expanding the spatial representations of students. When familiarizing with the methods of constructing projections of a point, by introducing transformations, the peculiarities of these constructions are revealed, the images are compared, highlighting the common in them and the difference, while eliminating the duplication of some subsequent questions of the theory. The application of this approach can be considered in the subsequent study of the drawing of a straight line, including familiarization with other methods of transformation.

When studying a straight line, determining its characteristics, you can make the most of various transformation methods in its definition. In textbooks, the image of a straight line begins with determining the position in space. There are two well-known positions:

1. Straight line in general position - inclined to all planes of projections, where they distinguish between ascending and descending.

2.Special (particular) positions of a straight line, where the straight lines are either parallel to one of any projection planes, or perpendicular to one and at an angle to the other. Such straight lines are called level straight lines and projecting lines. According to the proposed method, giving a generalized definition of direct private position, it is possible to comprehensively approach their consideration by introducing already familiar transformations. For example, a straight line of a level can be obtained from a straight line in general position by a single replacement of projection planes, and a projection straight line - by a two-fold replacement, (Fig. 2). When swapped twice, the original space remains static.

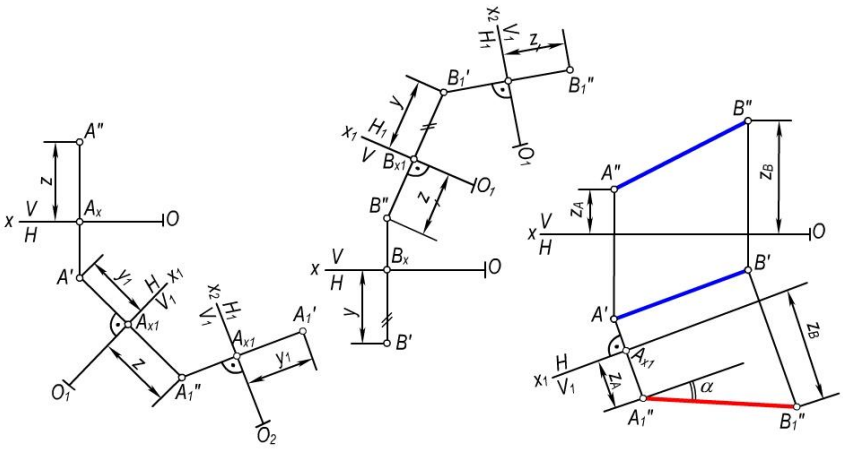


Figure 2 - replacement of projection planes.

Also in Figure 2, as a consequence, arising from the replacement of projection planes, the finding of the natural value of a straight line by the method of a right-angled triangle is presented. With this method, the problem can be solved without a coordinate system, which will reduce the construction time.

With the method of replacing projection planes, depending on the conditions of the problems and the prevailing circumstances of the solution, it is advisable to acquaint students with the possible options for the location of the axes of the new planes (Fig. 3), this makes it possible to more creatively approach the search for solutions to problems. This material can be consolidated in practical classes, forming the necessary knowledge among students.

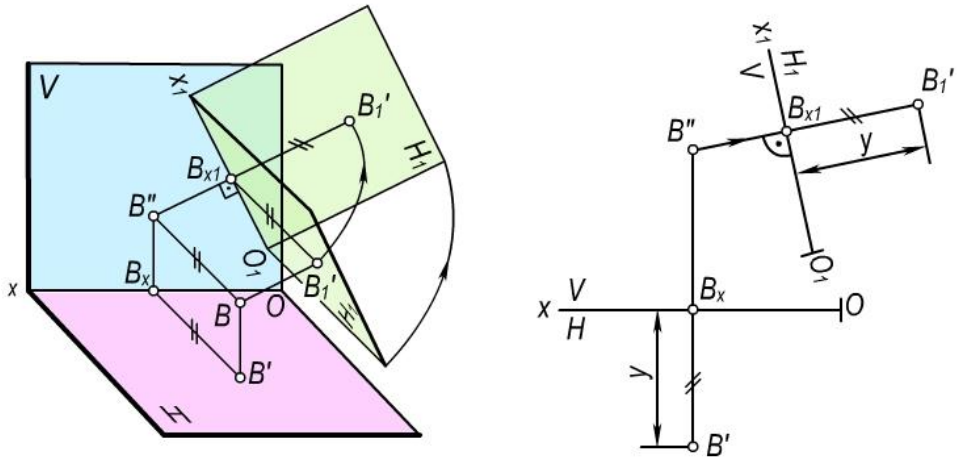
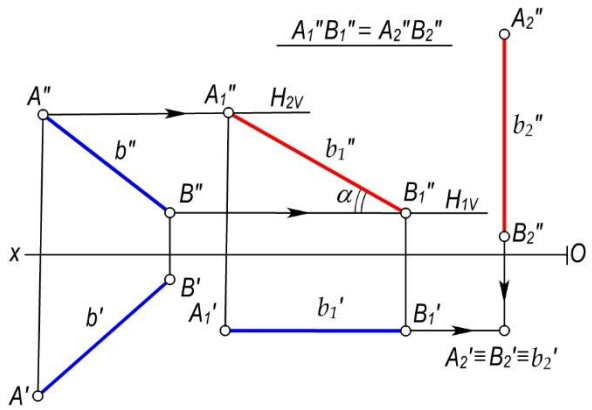


Figure 3 - Options for choosing the axes of coordinates

In addition to replacing projection planes, it becomes possible to familiarize students with the method of plane-parallel movement, where the original of the space is dynamic and moves in planes parallel to each other. This method can be used both in a system and without a coordinate system and apply variability in solving problems (Fig. 4).

Figure 4 - Plane-parallel movement



Further use of various methods of transformations in defining straight lines allows to expand students' understanding of the features of the image of straight lines and their position, as well as to apply a creative approach to work, using the most rational choice in solving problems. Along the way, obtaining new images of straight lines, if necessary, the concept of horizontal and frontal levels is introduced, horizontally projecting and frontally projecting.

This integrated approach is applied in the subsequent study of the plane drawing. In educational literature, as is known, the position of a plane in space can be specified: a) by three points that do not lie on one straight line; b) a straight line and a point taken outside the straight line; c) two intersecting straight lines; d) two parallel straight lines; e) traces. As an example, we took a plane defined by three points (triangle). As in the case of a straight line, plane projections also come in general and particular positions (projecting and level). In order to transform a general position plane into a particular (projecting) one, it is necessary to introduce the concept of straight lines of the plane level - horizontal and frontal, with the help of which this transformation occurs, and then, also using a familiar formula, build a level plane. Along the way, give a definition of horizontal, front-projection, horizontal and frontal level, etc.

This approach to the study of the position and characteristics of the planes, already known to students by the method of replacing projection planes, can be supplemented by different methods of transformation.

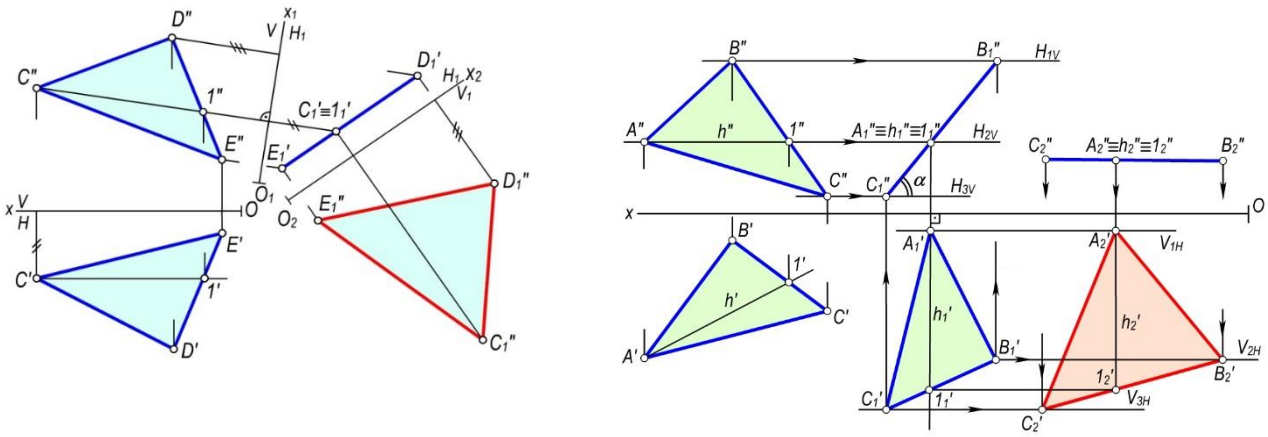


Figure -5. Plane transformation.

CONCLUSION

The proposed structure for the study of descriptive geometry using the conjugate method makes it possible to reduce the amount of study time for solving graphic problems, creates the prerequisites for the development of a creative approach in using variability in accordance with the circumstances. It also provides a basic basis for further study of the "Descriptive geometry" course, such as: cross-section of geometric bodies, mutual intersection of surfaces, construction of sweeps, etc.

The use of this technique contributes to the development of the necessary spatial representations in students, where both static and dynamic components are simultaneously formed and interact. All this enhances the culture of geometric graphic training of students, thereby creating the necessary basis for further study of the course of instructive geometry.

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